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Time Trends in Distal Colorectal Cancer Subsite Location Related to Age and How It Affects Choice of Screening Modality

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Background and Objectives: A time trend analysis of colorectal cancer (CRC) incidence in the distal colorectum as a proportion of total CRC is presented for the period 1977–1994 as a function of age, to determine the age at which Americans might best be served by screening fiberoptic sigmoidoscopy.
Methods: CRC incidence rates were obtained for each anatomic subsite from SEER Public Use Files for 1977, 1986, and 1994. The colorectum was divided anatomically for these analyses at the junction of the descending colon and sigmoid colon. Incidence in the distal colorectum was divided by total CRC incidence to determine the proportion of CRC in that age/race/gender/year cohort located in the distal colorectum.
Results: The proportion of distal CRC among African Americans was without a clear trend as they grew older in each of the years of observation and in both genders. However, in whites, with increasing age, the proportion of distal disease declined progressively in both genders, with the greatest decline in 1994. Distal CRC became less prevalent than proximal at about age 72 years in white women and at age 82 in white men in 1994.
Conclusions: As the white population becomes older, and for African Americans of all ages, more total colon screening modalities are needed, although at the onset of recommended screening, among 50- to 60-year-olds, fiberoptic sigmoidoscopy would appear efficacious.
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KEY WORDS: colorectal cancer; screening sigmoidoscopy; age, race, and gender

INTRODUCTION

Sigmoidoscopy is most useful as a screening tool for colorectal cancer (CRC) in those individuals most likely to have neoplastic disease in the distal colorectum [1]. The purpose of this report is to delineate the effect of age on the location of CRC in Caucasians and African Americans of both genders in the United States and how this pattern of risk has evolved over time. The time period covered will be 1977 to 1994 and the data source will be the Surveillance, Epidemiology, and End Results (SEER) program of the National Cancer Institute (NCI).

MATERIALS AND METHODS

CRC incidence data were obtained from the Surveillance, Epidemiology, and End Results (SEER) Public-Use files for 1977, 1986, and 1994. Crude incidence rates were generated using invasive colon cancer cases and population estimates from the nine standard SEER registries combined (for Connecticut, Iowa, New Mexico,

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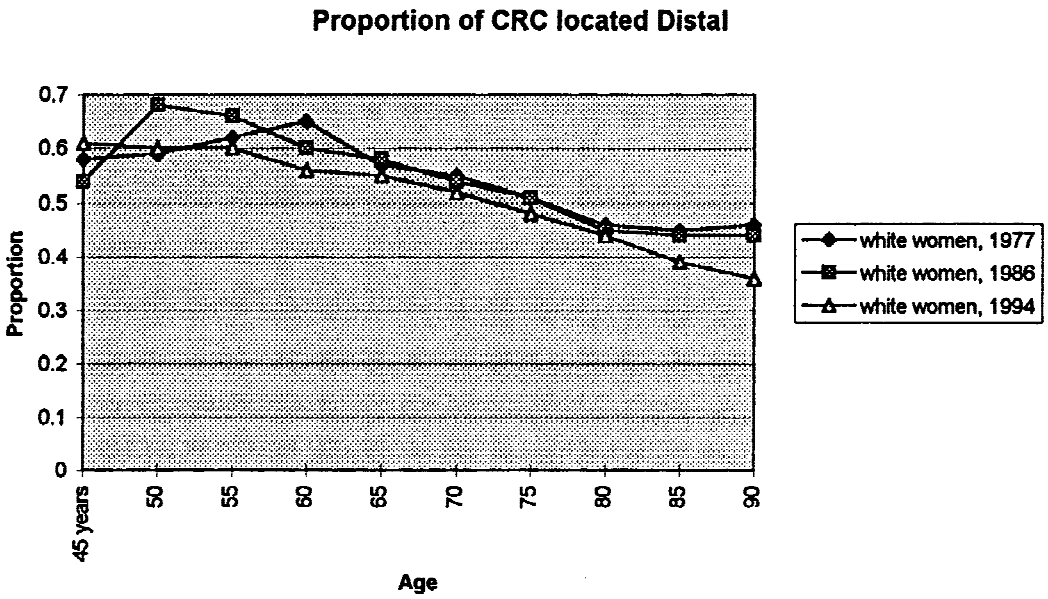

Fig. 1. Proportion of colorectal cancer (CRC) located in the distal colorectum (sigmoid, rectosigmoid, and rectum) in white women in 1977, 1986, and 1994. SEER data.

Utah, Hawaii, and the metropolitan areas of Detroit, San Francisco, Seattle–Puget Sound, and Atlanta [2]). Incidence rates were stratified by year of diagnosis, white or African American race, subsite within the colorectum, 5-year age cohort, and gender. The colorectum was then divided anatomically for these analyses at the junction of the descending and sigmoid colon; i.e., the proximal colon extended from the cecum through the descending colon and the distal colon included the sigmoid, rectosigmoid, and rectum. The rationale for this novel anatomic division is presented in the Discussion section. The anal canal was excluded as were tumors of site unspecified. The cancer rates in the distal colorectum were divided by the total CRC rates for each age/gender/race/year cohort to obtain a proportion of all CRC arising within the distal colorectum, within diagnostic range of the fiberoptic sigmoidoscope.

RESULTS

The results are shown in graphic form in Figures 1–4, which show the proportions of all CRC located in the distal colorectum (distal incidence of CRC divided by total CRC incidence for the particular age/race/gender group, using unadjusted SEER incidence data from 1977, 1986, and 1994). The proportion of CRC in the distal colorectum among African Americans appeared quite variable as they grew older in each of the years of observation and in both genders, without a clear trend. The proportion of distal CRC is <0.5 for most African American age cohorts in both genders. In whites, however, increased age was associated with a progressive decline in the proportion of distal disease in both genders, and in each year of observation, with the greatest and most consistent decline in 1994, the most recent year of observation. In the younger age cohorts of both genders, the distal CRC was more prevalent than the proximal CRC. The distal CRC became less prevalent than proximal (proportion <0.5) at about age 72 in white women and 82 in white men in 1994.

DISCUSSION

During the first 13 years of the SEER program, 1973–1986, mortality from CRC progressively declined [2], but incidence rose just as steadily. Unexpectedly and for reasons still being debated [3], the incidence of CRC began to decline in the United States in 1986 and has declined steadily since then. The pattern of declining age-adjusted incidence of CRC seen best among both white men and women in the distal colorectum [3]. A 25% decrease in CRC incidence in the distal colorectum in whites has been observed from 1986 to 1994.

This paper shows the evolution of CRC subsite location with advancing age in the United States. The 0.5 line in each graph marks the point at which 50% of CRC occurs in the distal colorectum, i.e., tumors that are probably within diagnostic range of the fiberoptic sigmoidoscope. For white women, it can be seen (Fig. 1) that in all time periods there is a dominance of left-sided disease in younger age groups with increasing risk in the proximal colorectum with advancing age and a gradual downward shift of the age curve from 1977 to 1994. The 0.5 line is not crossed, however, until roughly age 72 years. In white men much the same pattern exists (Fig. 2) with an upward (toward distal CRC) shift of the curves overall.

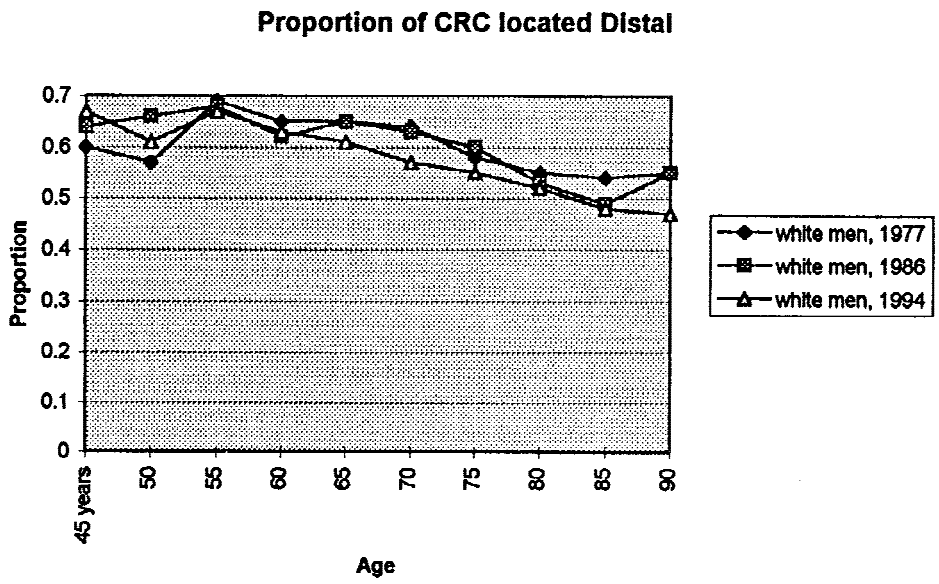

Fig. 2. Proportion of colorectal cancer (CRC) located in the distal colorectum (sigmoid, rectosigmoid, and rectum) in white men in 1977, 1986, and 1994. SEER data.

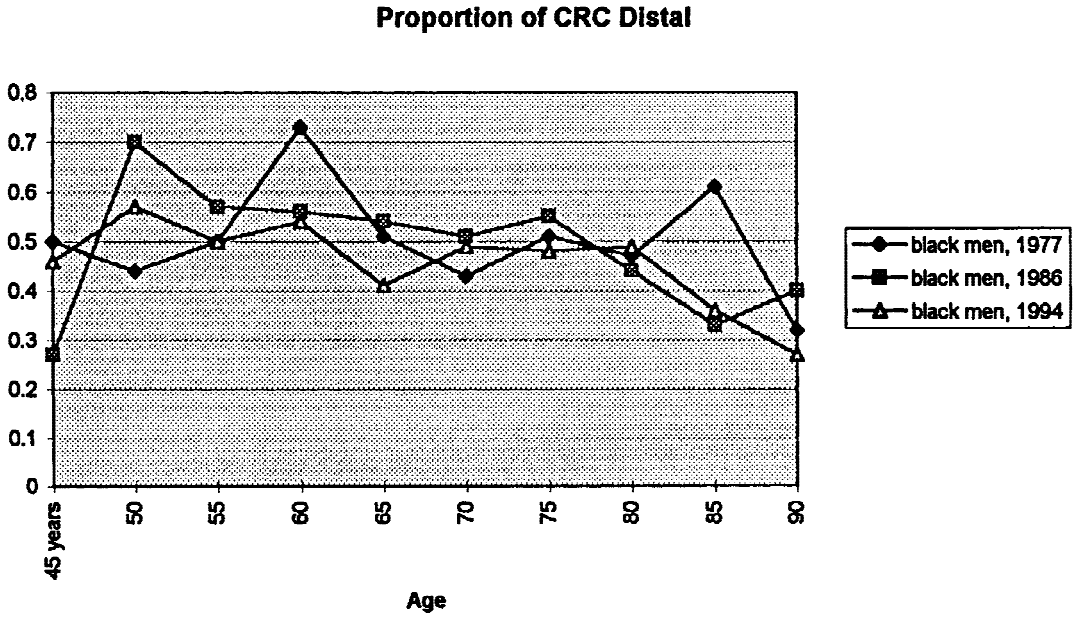

Fig. 3. Proportion of colorectal cancer (CRC) located in the distal colorectum (sigmoid, rectosigmoid, and rectum) in African American men in 1977, 1986, and 1994. SEER data.

In 1994 data, after age 82 years, the 0.5 line is crossed. Among African Americans, rates are much more irregular over time, although in general, as has been previously reported [4], proximal disease is more prevalent than in whites (Figs. 3, 4). Some of this variability in distal proportion among African Americans may be attributable to a smaller number of cancers in the African American cohorts than in whites: 2,462 versus 29,332, some age/gender/year groups numbering as few as six tumors.

Although this implies only a 50% sensitivity for the detection of CRC by sigmoidoscopy when the proportion equals 0.5, about one-half of individuals with proximal CRC will have an adenoma in the distal colorectum; in these cases, CRC will diagnosed by subsequent colonoscopy [5]. The sensitivity of screening fiberoptic sigmoidoscopy is therefore closer to 75% when the proportion of distal CRC is 0.5. This 75% or better sensitivity of sigmoidoscopy in younger whites greatly exceeds the sensitivity of fecal occult blood testing [1].

The anatomic division of the colorectum into distal

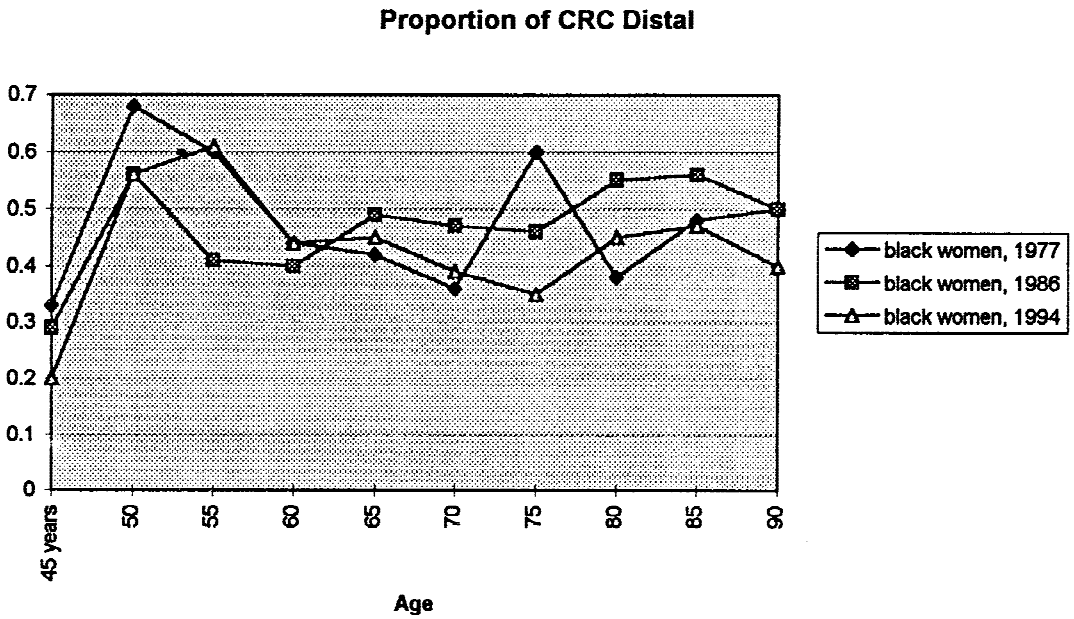

Fig. 4. Proportion of colorectal cancer (CRC) located in the distal colorectum (sigmoid, rectosigmoid, and rectum) in African American women in 1977, 1986, and 1994. SEER data.

and proximal was done in the manner described herein as a result of an analysis of race, gender, and age issues in CRC subsite location in Illinois [4]. In that work, it became apparent that grouping the sigmoid, rectosigmoid, and rectum together as distal, and all tumors proximal to that as proximal, was a more rational point of division than the traditional division of the large bowel into colon and rectum (with further subdivision into the right and left colon). Pathologic misclassification becomes less likely than when, for instance, tumors had to be classified as either rectal or rectosigmoid (a left colon subsite), because this latter region has such a high proportion of all CRC. The division is also more rational on embryologic (division is made at the border of the midgut and hindgut), physiologic, and anatomic grounds.

The dominance of male gender in distal CRC incidence and African American race in proximal CRC becomes clearer with this point of anatomic division [4]. In a response to that report, Saltzstein and colleagues [6] clarified the effect of age in multiple ethnic groups on CRC subsite location in an analysis of California data through the use of the graphic technique that we have subsequently employed in this report (Figs. 1–4). The SEER trends reported herein are most clearly delineated by the use of this graphic technique and the anatomic division of the colorectum as described above.

Distal disease can be screened for with great cost efficiency by fiberoptic sigmoidoscopy [1]. For those individuals in whom proximal disease is more prevalent, elderly whites and African Americans of all ages, total colon examination is indicated.

REFERENCES

1. Wagner JL, Behney CJ, Tunis SR, Ching A: Cost-effectiveness of colorectal cancer screening in average risk adults. Office of Technology Assessment. United States Congress. BP-H-146. April 1995.
2. Surveillance, Epidemiology, and End Results (SEER): Program public use CD-ROM (1973–1994). National Cancer Institute, DCPC, Surveillance Program, Cancer Statistics Branch, released May 1997 (based on the August 1996 submission).
3. Nelson RL, Persky V, Turyk M: Determination of factors responsible for the decline in incidence of colorectal cancer. (Submitted for publication.)
4. Nelson RL, Dollear T, Freels S, Persky V: The effect of age, race and gender to the subsite location of colorectal carcinoma. Cancer 1997;80:193–197.
5. Dinning JP, Hixson LJ, Clark LC: Prevalence of distal colonic neoplasia associated with proximal colon cancer. Arch Int Med 1994;154:853–856.
6. Saltzstein SL, Behling CA: The relation of age, race and gender on the subsite location of colorectal carcinoma. Cancer 1998;82:1408–1409.